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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/689,814	10/13/2000	Seung-pil Chung	SEC.760	7239

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EXAMINER
ALEJANDRO MULERO, LUZ L

ART UNIT	PAPER NUMBER
1763	10

DATE MAILED: 12/20/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

TC-10

Office Action Summary	Application No.	Applicant(s)	
	09/689,814	CHUNG ET AL.	
	Examiner	Art Unit	
	Luz L. Alejandro	1763	

-- The MAILING DATE of this communication app ars on th cover she t with the correspond nc address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 October 2002* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *7-11 and 38-43* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *7-11 and 38-43* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 39-40 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Once a limitation is introduced into a claim, subsequent use of that limitation must use either -- the -- or – said --, or be appropriately differentiated to represent a different limitation. Note that the term "processing chamber" in claim 39-line 2 is previously used in claim 38-lines 2-3.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) do not apply to the examination of this application as the application being examined was not (1) filed on or after November 29, 2000, or (2) voluntarily

published under 35 U.S.C. 122(b). Therefore, this application is examined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

Claims 7, 11, 38, and 41-42 are rejected under 35 U.S.C. 102(e) as being anticipated by Shinriki et al., U.S. Patent 6,143,081.

Shinriki et al. shows the invention as claimed including including an apparatus comprising: a vertically movable susceptor (214,224) installed at a lower portion of a processing chamber, for receiving a wafer W thereon; a heater 280 comprising a lamp and installed at an upper portion of the processing chamber; and a gas diffuser 244 installed below the heater, for supplying reaction gases into the processing chamber (see Fig. 13 and col. 19-lines 11-57).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was

not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 7-8, 11, 38, and 41-43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Iida et al., U.S. Patent 5,527,417 in view of Yin et al., U.S. Patent 6,189,484.

Iida et al. shows the invention substantially as claimed including an apparatus with a susceptor installed at a lower portion of a processing chamber (see fig. 3), for receiving a wafer 106 thereon; a heater 102 installed at an upper portion of the processing chamber; and a gas diffuser 112 installed below the heater, for supplying reaction gases into the processing chamber (see fig. 3 and col. 9-lines 3-51).

Iida et al. fails to expressly disclose the susceptor being vertically movable and a cooling line contained within the susceptor. Yin et al. discloses an apparatus with a heating element 170 in the upper portion of the processing chamber whereby the susceptor 137 is vertically movable by an actuator 192 (see fig. 1 and col. 6-lines 1-21). Furthermore, the susceptor 137 can also contain a cooling line therein (see col. 6-lines 9-11). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Iida et al. so as to include the vertically moving susceptor and cooling line of Yin et al. because this allows for optimization of wafer exposure to plasma, easy removability of the wafer from the processing chamber, and better temperature control of the wafer.

Claims 7, 11, 38, and 41-42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Iida et al., U.S. Patent 5,527,417 in view of Shinriki et al., U.S. Patent 6,143,081.

Iida et al. shows the invention substantially as claimed including an apparatus with a susceptor installed at a lower portion of a processing chamber (see fig. 3), for receiving a wafer 106 thereon; a heater 102 installed at an upper portion of the processing chamber; and a gas diffuser 112 installed below the heater, for supplying reaction gases into the processing chamber (see fig. 3 and col. 9-lines 3-51).

Iida et al. fails to expressly disclose the susceptor being vertically movable. Shinriki et al. discloses an apparatus comprising: a vertically movable susceptor (214,224) installed at a lower portion of a processing chamber, for receiving a wafer W thereon (see fig. 13 and col. 19-lines 11-57). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the primary reference of Iida et al. so as to include the vertically movable susceptor of Shinriki et al. because this allows for optimization of the process performed in the apparatus by being able to change the distance between the wafer and the active gas, and easier removability of the wafer from the processing chamber (see col. 18-lines 6-25 of Shinriki et al.).

Claims 9-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Iida et al., U.S. Patent 5,527,417 in view of Yin et al., U.S. Patent 6,189,484 as applied to

claims 7-8, 11, 38, and 41-42 above, and further in view of Shang et al., U.S. Patent 6,182,603.

Iida et al. and Yin et al. are applied as above but fail to expressly disclose a gas supply line for receiving the reaction gases supplied via pipes installed outside the processing chamber, the first pipe having a microwave guide for changing a gas mixture containing a hydrogen gas and a fluorine-containing gas in a predetermined ratio, or the hydrogen gas only, into a plasma state, and a second pipe for supplying the fluorine-containing gas into the processing chamber. Shang et al. discloses a first pipe containing a sapphire tube 77 which is coupled to a microwave guide 68 for exciting a gas into a plasma and a second pipe 53 for supplying gas to the processing chamber (see Fig. 1 and col. 4-line 15 to col. 5-line 46). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Iida et al. modified by Yin et al., so as to include the pipe structure of Shang et al. because this will result in the capability of cleaning the apparatus without causing the damage that sometimes occurs when generating plasma in the processing chamber (see col. 2-lines 36-62 of Shang et al.).

With respect to the particular gas being transported through the pipes, such limitation is directed to a method limitation instead of an apparatus limitation, and since an apparatus is being claimed the method limitations are not given patentable weight. The method limitations are considered an intended use which does not patentably distinguish an apparatus claim. The apparatus of Iida et al. modified by Yin et al. and

further modified by Shang et al. is capable of supplying the specific claimed gases, through the pipes, to the apparatus.

With respect to the porous plate of claim 9, the Iida et al. reference shows a porous plate forming the bottom of the diffuser, for evenly distributing the reaction gases into the processing chamber, wherein the diffuser is in flow contact with the gas supply line (see fig. 3).

Claims 39-40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Iida et al., U.S. Patent 5,527,417 in view of Shinriki et al., U.S. Patent 6,143,081 as applied to claims 7, 11, 38, and 41-42 above, and further in view of Collison et al., U.S. Patent 6,203,657.

Iida et al. and Shinriki et al. are applied as above but fail to expressly disclose wherein the gas diffuser is connected to two separate pipes extending outside of said processing chamber, one of the two pipes being adapted to supply to the gas diffuser a first gas excited to a plasma state and another of the two pipes being adapted to supply to the gas diffuser a second gas that is in a non-plasma state. Collison et al. discloses a gas diffuser 124 connected to two separate pipes extending outside of said processing chamber, one of the two pipes 108 being adapted to supply to the gas diffuser a first gas excited to a plasma state and another of the two pipes 222 being adapted to supply to the gas diffuser a second gas that is in a non-plasma state (see figs. 2B and 3 and col. a state (see figs. 2B and 3 and col. 7-line 12 to col. 8-line 26). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at

the time the invention was made to modify the Iida et al. apparatus modified by Shinriki et al. so as to include the gas diffuser structure of Collison et al. because such an apparatus would allow more flexibility as to the processes being conducted within the apparatus, and can provide for a longer life of the apparatus.

Claims 39-40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Iida et al., U.S. Patent 5,527,417 in view of Yin et al., U.S. Patent 6,189,484 as applied to claims 7-8, 11, 38, and 41-42 above, and further in view of Collison et al., U.S. Patent 6,203,657.

Iida et al. and Yin et al. are applied as above but fail to expressly disclose wherein the gas diffuser is connected to two separate pipes extending outside of said processing chamber, one of the two pipes being adapted to supply to the gas diffuser a first gas excited to a plasma state and another of the two pipes being adapted to supply to the gas diffuser a second gas that is in a non-plasma state. Collison et al. discloses a gas diffuser 124 connected to two separate pipes extending outside of said processing chamber, one of the two pipes 108 being adapted to supply to the gas diffuser a first gas excited to a plasma state and another of the two pipes 222 being adapted to supply to the gas diffuser a second gas that is in a non-plasma state (see figs. 2B and 3 and col. a state (see figs. 2B and 3 and col. 7-line 12 to col. 8-line 26). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Iida et al. apparatus modified by Yin et al. so as to include the gas diffuser structure of Collison et al. because such an apparatus

would allow more flexibility as to the processes being conducted within the apparatus, and can provide for a longer life of the apparatus.

Response to Arguments

Applicant's arguments filed 10/4/02 have been fully considered but they are not persuasive. Applicant argues that the heating element 280 in Shinriki et al. is not a heater installed at an upper portion of the processing chamber as required by the claims. However, it appears that the heating element 280 in Shinriki et al. is similar to the heating element in applicant's invention in that it is within the processing chamber but separated from the gases within the chamber by a transparent window (see fig. 1 of applicant's invention). Therefore, the rejection under 35 USC 102 using the Shinriki et al. reference is maintained.

Regarding the contention that in the Iida et al. reference the element 112 cannot be the gas diffuser as required by the claims because purge gas is used and not reaction gas, this particular limitation is a method limitation and not an apparatus limitation. Since an apparatus is being claimed as the instant invention, the method teachings are not considered to be the matter at hand, since a variety of methods can be done with the apparatus. Method limitations such as the one discussed above are viewed as intended uses which do not further limit, and therefore do not patentably distinguish the claimed invention. Additionally, applicant contends that the UV lamp at the upper portion of the chamber in Iida et al. is not a heater because the heater is located below the wafer. However, heating from both above and below the wafer is

commonly done to maintain a constant temperature on both sides of the wafer (see U.S. Patent 6,284,048). It is clear that the energy from the ultraviolet light in Iida et al. reaches the substrate and in that way inherently the substrate will be heated.

Regarding the examiner's use of the Yin et al. reference, Yin et al. specifically states at col. 6-lines 9-11, that the wafer pedestal base may include heating and cooling hardware which is not shown in the figures. It is clear that this heating and cooling hardware is used to heat the wafer and not to heat an anode electrode or any other such structure. With respect to the motivation to combine the Iida et al. and Yin et al. references, it is clear that combining the vertical susceptor of Yin et al. with Iida et al. will allow for optimization of wafer exposure to plasma, if it is desired by the operator to use the plasma for wafer processing, and will also allow for optimization of wafer exposure to the light in the apparatus of Iida et al.. Furthermore, upon completion of the processing, the vertically movable susceptor will allow for placing the wafer at a specific height to allow for easy removal from the chamber. For these reasons, the rejection of Iida et al. in view of Yin et al. is respectfully maintained. Regarding claim 8, there are many susceptors or wafer holders in which heating and cooling is simultaneously present in the susceptor (see U.S. Patent 5,290,381). Furthermore, it should be noted that the susceptor is shown in Fig. 3 of Iida et al. but is not indicated by a reference number. The susceptor, as broadly claimed, can be described as the support including the heater on which the wafer 106 lies.

Concerning the rejection of claims 7 and 11 over Iida et al. in view of Shinriki et al., applicant argues that the heating element in Shinriki et al. is outside and not inside

the processing chamber. However, it appears that the heating element 280 in Shinriki et al. is similar to the heating element in applicant's invention in that it is within the processing chamber but separated from the gases within the chamber by a transparent window (see fig. 1 of applicant's invention). Furthermore, in response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988)and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, adjusting the separation between the wafer and the heating element optimize the process being performed and specifically, it will allow for adjustment of the heating of the front surface of the wafer by the lamps in the upper portion of the processing chamber.

With respect to applicant's arguments with respect to claims 9-10, applicant is arguing intended uses of the apparatus (for example, whether the gas being used is a cleaning gas, source gas, inert gas, etc.). Since an apparatus is being claimed as the instant invention, the method teachings are not considered to be the matter at hand, since a variety of methods can be done with the apparatus. Method limitations such as the type of gas being used are viewed as intended uses which do not further limit, and therefore do not patentably distinguish the claimed invention. It is clear that the

apparatus of Iida et al. in view of Yin et al. is capable of flowing a variety of different kinds of gases into the gas diffuser.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Luz L. Alejandro whose telephone number is 703-305-4545. The examiner can normally be reached on Monday to Thursday from 7:30 to 6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory L. Mills can be reached on 703-308-1633. The fax phone numbers

for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

Luz L. Alejandro
Patent Examiner
Art Unit 1763

December 13, 2002